

REMARKS

Reconsideration of this application, based on this amendment and these following remarks, is respectfully requested.

Claims 1 through 16 and 23 through 29 remain in this case. Claims 2, 3, 10, 12, 13, 18, 22 through 25, and 27 through 29 are amended. Claim 17 is canceled.

Claim 10 is amended to correct minor errors of a typographical nature, and to insert a missing dependency. Applicant submits that the amendment presented to claim 10 is in no way narrowing nor is presented for any reason related to patentability.¹ No new matter is presented by this amendment to claim 10, and entry of the amendment is respectfully requested.

Claims 2, 3, 12, and 13 are amended to recite the element of the MUX by its more conventional name "multiplexer". Applicant submits that the amendment presented to claims 2, 3, 12, and 13 is in no way narrowing nor is presented for any reason related to patentability.² No new matter is presented by this amendment to these claims.

Claims 23 through 25 were rejected under §112, ¶2 as indefinite for failing to particularly point out and distinctly claim the subject matter of the invention. In particular, the Examiner objected to the further limitation of a method claim with a device (demodulating finger, controller, plurality of demodulating fingers, for claims 23 through 25, respectively).³

Claims 23 through 25 are amended to recite the named devices implicitly within further limitations to method steps; claim 23 is presented in independent form, as will be further discussed below. Claims 27 through 29 are amended in similar fashion, to avoid any similar question regarding their definiteness. Applicant submits that the amendment presented to

¹ See *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., Ltd.*, 535 U.S. 722, 62 USPQ2d 1705 (2002), on remand, 304 F.3d 1289, 64 USPQ2d 1698 (Fed. Cir. 2002).

² See *Festo, supra*.

³ Office Action of January 14, 2004, page 2, ¶2.

these claims is in no way narrowing,⁴ and presents no new matter. Applicant further submits that this amendment to claims 23 through 25 places these claims in sufficiently definite form as to meet the requirements of §112, ¶2. Entry of this amendment, and withdrawal of the §112 rejection, are respectfully requested.

Claims 1 through 6, 8, 9, 11 through 15, 17 through 21, 23, 24, 26, and 28 were rejected under §103 as unpatentable over the Secord et al. reference⁵ in view of the Spock reference⁶. The Examiner asserted, relative to claims 1, 11, 17, 21, 23, and 24, that the Secord et al. reference discloses all elements of the claims except for the presence of the soft symbol from decoding in the demodulating fingers, which was taught by the Spock reference.⁷ The Examiner further asserted that it would have been obvious to the skilled artisan to have incorporated the demodulating and decoding from the Spock reference into the rake receiver of the Secord et al. reference in order to permit reallocation of demodulation resources and to reduce circuitry for multiple information sources.⁸ Certain others of the dependent claims were also specifically rejected as unpatentable over this combination of references, because their limitations were also found in one or the other of these reference.⁹

Claims 10 and 29 were rejected under §103 as unpatentable over the Secord et al. and Spock references as applied above¹⁰ and further in view of the Kuo reference¹¹. The Examiner asserted that the Kuo reference teaches first and second multipath delays in a demodulator, which would have been obviously combined into the fingers of Secord et al. so that one finger could handle the first sample stream first multipath delay and the second figure could handle the second delay.¹²

⁴ See *Festo, supra*.

⁵ U.S. Patent No. 6,097,712, issued August 1, 2000 to Secord et al.

⁶ U.S. Patent No. 5,903,550, issued May 11, 1999 to Spock.

⁷ Office Action, *supra*, page 3, ¶14.

⁸ *Id.*

⁹ Office Action, *supra*, pp. 3 through 5, ¶¶4.

¹⁰ Relative to claim 9, as asserted in the Office Action.

¹¹ U.S. Patent No. 6,507,604 B1, issued January 14, 2003 to Kuo, filed August 31, 2000.

¹² Office Action, *supra*, pp. 5 and 6, ¶¶5.

Claims 7, 16, 22, 25, and 27 were rejected under §103 as unpatentable over the Secord et al. and Spock references, as applied to claims 6 and 15, and further in view of the Oishi et al. reference¹³. The Examiner asserted that the Oishi et al. reference teaches the assigning of a first sample stream from a first carrier to a first demodulating finger, a second sample stream from a second carrier to a second demodulating finger, and a third sample stream from a third carrier to a third demodulating finger, and the selecting of each sample stream from the plurality of sample streams, and that it would have been obvious to combine the selecting of Oishi et al. into the Secord et al. system together with the soft symbols from Spock to have an efficient operation and circuit.¹⁴

Applicant respectfully traverses the §103 rejection of the claims, on the grounds that the combined teachings of the references fall short of the requirements of the claims.

Claim 1 requires a plurality of demodulating fingers, each having a sample stream input that accepts the plurality of sample streams, and having a selection input connected to the output of a controller to accept sample stream selection commands from the controller. Each demodulating finger provides soft symbols from the selected sample stream to provide soft symbols at a soft symbol output.

The system of claim 1 provides important advantages over conventional systems. As described in the specification,¹⁵ conventional CDMA RAKE receivers either hardwire the outputs of multiple demodulating fingers, in which case the number and order of information channels that are combined are constricted, or use a downstream CPU or DSP device to use software to combine soft symbols output by the fingers, which is constrained by computational capacity and bandwidth. The inventive system of claim 1 provides a great deal of flexibility in the assigning of sample streams to demodulating fingers, avoiding the constraints of the

¹³ U.S. Patent No. 6,563,859 B1, issued May 13, 2003 to Oishi et al., filed November 15, 1999.

¹⁴ Office Action, *supra*, page 6, ¶6.

¹⁵ Specification of S.N. 09/684,886, at page 4, line 21 through page 5, line 16.

hardwired systems and without requiring large output bandwidth or significant downstream computational effort.¹⁶

Applicant respectfully submits that the combined teachings of the references fall short of the requirements of claim 1, because none of the references disclose a plurality of demodulating fingers, each having a sample stream input to accept a plurality of sample streams and a selection input to accept sample stream selection commands.

The Examiner points to the input to element 52 in Figures 5 and 6 of the Secord et al. reference as corresponding to a sample stream input that accepts a plurality of sample streams, and to the first input of element 54 in these Figures 5 and 6 as the selection input connected to a controller to accept sample stream selection commands.¹⁷ However, Applicant submits that this interpretation of the Secord et al. reference is in error. While the Secord et al. reference teaches that each of its fingers includes a plurality of multipliers 52, each receiving a signal A, B, or C,¹⁸ there is no selection made by the finger of the Secord et al. reference among these signals. Rather, as the reference itself clearly states, each finger "comprises, for each of the three signals A, B, C, a respective path comprising complex signal multipliers 52, 54, and 60" and that "[t]he outputs of the multipliers 60 are summed by a summing unit 62 to produce the output signal for the respective finger".¹⁹ As such, if one considers the three signals A, B, C as a plurality of sample streams, there is no selection made among these three signals; rather, all three signals as processed are combined into the output. Therefore, the demodulating fingers of the Secord et al. system do not have a selection input to accept sample stream selection commands. Contrary to the assertion by the Examiner, multiplier 54 does not receive such a selection input; rather, its inputs are clearly the output of multiplier 52 and the Walsh code sequence W(i, k).²⁰ And therefore, there is no controller disclosed in the Secord et al. reference that has an output for selecting a sample stream, as is also required by the claim. Accordingly, Applicant submits that

¹⁶ See specification, *supra*, page 5, line 17 through page 8, line 6.

¹⁷ Office Action, *supra*, page 3, ¶4.

¹⁸ Secord et al., *supra*, column 5, lines 15 through 22.

¹⁹ *Id.*

²⁰ Secord et al., *supra*, column 5, lines 26 through 29.

the Secord et al. reference does not disclose the plurality of demodulating fingers as required by claim 1, nor does it disclose the controller of the claim.

The other references of record also fail to disclose demodulating fingers that accept a plurality of sample streams and sample stream selection commands. The Spock reference appears to teach a downstream processing unit (its decoder) that receives and combines the soft symbols,²¹ similarly as the conventional software combining approach described in the specification of this application.²² The Kuo reference is silent in this regard, while the Oishi et al. reference discloses a selector in advance of the demodulating fingers, for assigning a signal of each channel to each finger.²³ As such, none of these secondary references anywhere disclose a plurality of demodulating fingers, each of which have a sample stream input to accept a plurality of sample streams, and a selection input to accept sample stream selection commands from a controller, as required by claim 1. Nor does the Examiner assert that these references provide such teachings.

Accordingly, Applicant submits that the combined teachings of the references fall short of the requirements of independent claim 1 and its dependent claims 2 through 10.

Applicant further respectfully submits that there is no suggestion from the references to modify their teachings in such a manner as to reach the system of claim 1 and its dependent claims.

The demodulating system of the Secord et al. reference in fact corresponds to the conventional systems described in the specification of this application.²⁴ According to the Secord et al. reference, the outputs of the demodulating fingers are hardwired in the sense that the channels in each demodulating finger are combined at output O/P, and forwarded to a downstream DSP or ASIC device.²⁵ And, as mentioned above, there is no selection among the plurality of sample streams performed at the fingers themselves, according to the Secord et al.

²¹ Spock, *supra*, Figures

²² Specification, *supra*, page 5, lines 10 through 16.

²³ Oishi et al., *supra*, column 7, lines 56 through 60. See also Office Action, *supra*, page 6, ¶6.

²⁴ Specification, *supra*, page 4, line 21 through page 5, line 9.

reference. The Spock, Kuo, and Oishi et al. references, as mentioned above, add no teachings in this regard, and none of these secondary references provide any motivation to modify the combined teachings of these references in such a manner as to provide demodulating fingers that have an input accepting a plurality of sample streams and a selection input accepting sample stream selection commands, as required by claim 1.

In addition, the advantages provided by this invention, particularly in providing flexibility in the demodulation of information channels in a plurality of sample streams in a direct sequence spread spectrum (DSSS) communications receiver, while avoiding large output bandwidth or significant downstream computational effort, stem directly from the differences between the claimed system and the prior art. These important advantages support the patentability of claim 1 and its dependent claims.

For these reasons, Applicant respectfully submits that claim 1 and its dependent claims are patentably distinct over the applied prior art.

Claims 2 through 4 further require, relative to claim 1 upon which they depend, that each demodulating finger include a multiplexer having inputs connected to accept the plurality of sample streams and to accept the sample stream selection command, and an output providing the selected sample stream.

As mentioned above, the Examiner asserted that element 54 of the Secord et al. reference corresponds to the multiplexer of claim 2. However, it is clear from the teachings of the reference that element 54 is a *multiplier*²⁵ and not a *multiplexer* as claimed (or even a "MUX" as originally claimed). Accordingly, the multiplier 54 of the Secord et al. reference is not capable of receiving a plurality of sample streams, a sample stream selection command, and to then provide, at its output, the selected sample stream as required by claims 2 through 4. This absence of the multiplexer in the reference further illustrates the absence of any suggestion from

²⁵ See Secord et al., *supra*, Figures 4 through 8; column 7, lines 16 through 30.

²⁶ See Secord et al., column 5, lines 15 through 22, and lines 27 through 30.

the Secord et al. reference to modify its teachings, individually or in combination with the other prior art applied against the claims, and further supports the patentability of claims 2 through 4.

Applicant therefore respectfully submits, for this additional reason, that the combined teachings of the references falls even further short of claims 2 through 4 in this case, and that these claims are therefore further patentably distinct over the prior art of record in this case.

Similarly, claim 11 is directed to a demodulating finger that has a sample stream input to accept a plurality of sample streams, a selection input to accept sample stream selection commands, and a soft symbol output to provide soft symbols from demodulated information channels in the selected sample stream. The demodulating finger of claim 11 provides similar advantages in DSSS receivers as mentioned above relative to claim 1, particularly in providing flexibility in the sample stream to which its demodulation is applied, avoiding the constraints of the hardwired systems without requiring large output bandwidth or significant downstream computational effort.

Applicant respectfully submits that the combined teachings of the references fall short of the requirements of claim 11, because none of the references disclose a demodulating finger having a sample stream input to accept a plurality of sample streams and a selection input to accept sample stream selection commands, as required by claim 11.

As discussed above relative to claim 1, Applicant submits that the Examiner's interpretation of the Secord et al. reference is in error and that therefore the rejection of claim 11 and its dependent claims is in error. Nowhere does the Secord et al. reference show any of its demodulating fingers as making any selection among its input signals; instead, each finger of the Secord et al. reference processes each of the three signals A, B, C and provided a summed output signal from these signals as its output signal. Therefore, if even if one were to consider the three signals A, B, C as a plurality of sample streams, the demodulation finger of the Secord et al. reference makes no selection among these three signals. Accordingly, there is no selection input, in the finger of the Secord et al. reference, that accepts sample stream selection commands; as mentioned above, multiplier 54 of the reference cannot receive such a selection

input because its function is instead to multiply the output of multiplier 52 with a corresponding Walsh code sequence $W(i, k)$.²⁷ Accordingly, Applicant submits that the Secord et al. reference does not disclose the demodulating finger recited in claim 11, contrary to the assertion of the Examiner.

The other references of record also fail to disclose a demodulating finger that accepts a plurality of sample streams and sample stream selection commands, as discussed above relative to claim 1.

Accordingly, Applicant submits that the combined teachings of the references fall short of the requirements of independent claim 11 and its dependent claims 12 through 16.

Applicant further respectfully submits that there is no suggestion from the references to modify their teachings in such a manner as to reach the demodulating finger of claim 11 and its dependent claims.

As discussed above, the demodulating systems of the applied references either correspond to conventional hardwired or software-based systems as described in the background of this invention, or the references are completely silent regarding the assigning of sample streams to demodulating fingers, and finger channels. Accordingly, Applicant submits that there is no suggestion to modify these combined teachings in such a manner as to reach the requirements of claim 11. This lack of suggestion is especially apparent considering that the advantages provided by this invention are the direct result of the differences between the invention as claimed in claim 11 and the prior art.

For these reasons, Applicant respectfully submits that claim 11 and its dependent claims are patentably distinct over the applied prior art.

Similarly as discussed above relative to claims 2 through 4, claims 12 through 14 further require, relative to claim 11 upon which they depend, a multiplexer having inputs connected to accept the plurality of sample streams and to accept the sample stream selection command, and

²⁷ Secord et al., *supra*, column 5, lines 26 through 29.

an output providing the selected sample stream. There is no mention of such a multiplexer in any of the applied references; the element referred to by the Examiner as corresponding to such a multiplexer is instead a multiplier, and performs no selection function whatsoever.

Applicant therefore respectfully submits, for this additional reason, that the combined teachings of the references falls even further short of claims 12 through 14 in this case, and that these claims are therefore further patentably distinct over the prior art of record in this case.

Independent method claim 17 is canceled, and claim 23 is amended to be placed in independent form incorporating the steps of original claim 17 (and to overcome the §112 rejection, as discussed above), to advance the prosecution of this case. The dependency of claim 18 through 22 is also changed, to now depend (directly or indirectly) upon amended claim 23.

Similarly as claims 1 and 11 discussed above, but in method form, amended claim 23 requires the step of accepting a plurality of sample streams at a demodulating finger, selecting a sample stream responsive to sample stream selection commands, and operating the demodulating finger to provide soft symbols from the selected sample stream. The method of claim 23 provides the important advantages as discussed above relative to claims 1 and 11, particularly in providing excellent flexibility in demodulation without overburdening the communication bandwidth or downstream processing devices and functions.

Applicant respectfully submits that the combined teachings of the references fall short of the requirements of claim 23, because none of the references disclose the steps of accepting a plurality of sample streams at a demodulating finger, and selecting a sample stream with the demodulating finger responsive to sample stream selection commands, as required by claim 23.

As discussed above relative to claims 1 and 11, Applicant submits that the Examiner's interpretation of the Secord et al. reference is incorrect, and that the Secord et al. reference in fact fails to show any of its demodulating fingers as making any selection among its input signals. Rather, each finger of the Secord et al. reference processes each of the three signals that it receives, and sums the output signals from these three components to produce its output signal. There is simply no selection from among these three signals that is disclosed by the

reference. As mentioned above, multiplier 54 of the Secord et al. reference, asserted as receiving a selection input, does not make any such selection, because it instead multiplies the output of multiplier 52 with a corresponding Walsh code sequence $W(i, k)$.²⁸ Accordingly, Applicant submits that the Secord et al. does not disclose the selecting step recited in claim 23, contrary to the assertion of the Examiner. The other references of record also fail to disclose the selecting step required by claim 23, as discussed above relative to claims 1 and 11.

Accordingly, Applicant submits that the combined teachings of the references fall short of the requirements of independent claim 23 and its dependent claims 18 through 22 and 24 through 29.

Applicant further respectfully submits that there is no suggestion from the references to modify their teachings in such a manner as to reach the demodulating finger of claim 23 and its dependent claims.

As discussed above, the disclosed demodulating systems and methods correspond to conventional hardwired or software-based systems as described in the background of this invention (if they at all mention the assigning of sample streams to demodulating fingers, and finger channels). Accordingly, Applicant submits that there is no suggestion to modify these combined teachings in such a manner as to reach the requirements of claim 23, especially considering that the important benefits of this invention directly result of the differences between the method of claim 23 and the prior art.

For these reasons, Applicant respectfully submits that amended claim 23 and its dependent claims are patentably distinct over the prior art of record in this case.

²⁸ Secord et al., *supra*, column 5, lines 26 through 29.

For the above reasons, Applicant respectfully submits that all claims now in this case are in condition for allowance. Reconsideration of the above-referenced application is therefore respectfully requested.

Respectfully submitted,



Rodney M. Anderson
Registry No. 31,939
Attorney for Applicant

Anderson, Levine & Lintel, L.L.P.
14785 Preston Road, Suite 650
Dallas, Texas 75254
(972) 664-9554

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Rodney M. Anderson
Registry No. 31,939